

SCIENTIFIC SERIALS

THE *Journal of the Franklin Institute*, November 1873.—In this number Mr. Richards, mechanical engineer, communicates the first part of a treatise on "The Principles of Shop Manipulation for Engineering Apprentices;" the points dealt with being these: plans of studying (and here he advocates the order, first, machine functions, next, plans or adaptations of machines, third, construction of machines), nature of mechanical engineering, engineering as a calling, and the conditions of apprenticeship.—Dr. Coolley, in a lecture-extract, shows how convection may be usefully applied in detection of heat. He has an instrument somewhat like a Coulomb electrometer; in a glass case, a thin glass tube with black pith ball at one end is suspended horizontally by a silk fibre over a graduated disc. A heated body is introduced near the ball, which immediately swings towards it; while a cold body will repel the ball; these effects being due to air currents. The experiments Dr. Coolley makes, show that this forms a very sensitive thermoscope.—An account is furnished of the Cleveland Waterworks Tunnel, just completed, and which is similar to the one at Chicago. The shore section and lake section were carried on simultaneously, 40 ft. to 70 ft. below the bottom of the lake; the starting-points being a mile and a quarter apart. The work was somewhat disturbed by quicksands, but the sections met on an exact level. The capacity of the tunnel is 60 to 70 million gallons daily; though the average daily consumption is at present only about 6 million gallons.—A new process is described for utilising coal waste. The inventor uses, as a cement, only yellow clay with some milk of lime, but no bituminous or resinous matter; merely waterproofing the surface with a solution of rosin. From first to last no handling is required; and the lumps are delivered, in shape and size like hen's eggs. The process is highly commended.—We find notes on American machinery abroad, friction of screw propellers in water, &c., and, among other novelties of construction described, a planing bar, a compound beam engine, an anti-friction journal, an irrigating machine, and a new optical toy (Prof. Dolbear).

Annalen der Chemie und Pharmacie. Band 169, Heft 1, u. 2.—We notice that in this number Liebig's name disappears from the list of editors, and the title is changed to *Justus Liebig's Annalen der Chemie und Pharmacie*. The following papers are published:—Hubner and Post on the constitution of bromtoluol in relation to its hydrogen atoms. The authors give a collection of minor papers by various authors, dealing with the substitution of different hydrogen atoms in the formula by various radicles.—On the estimation of nitrogen, by S. W. Johnson. The author finds that a mixture of sulphate or carbonate of sodium with slaked lime can be employed instead of the soda-lime usually used in Varentrapp's and Will's processes. The mixture, when heated, of course, yields sodic hydrate and sulphate or carbonate of calcium. Experiments made with such mixtures are described.—On the nitro derivatives of naphthalin, by F. Beilstein and A. Kuhlberg. The mono-, di-, and tri-nitro compounds are described.—On atacamite, by E. Ludwig. The author proposes some alteration in the ideas of the constitution of this mineral, advocated by Rammelsberg and others, his suggestions being based upon the way in which the substance gives up its water at different temperatures; he also makes some suggestions as to formula of brochantite.—On the action of sulphocarbonyl chloride on amidogen compounds, by B. Rathke and P. Schäfer.—Note on a polyacetone, by W. Heintz.—On the production of talania by means of potassic cyanide, and on a by-product of the reaction by W. Heintz. The author gives details of the preparation of alanin, the by-product is lactyl-urea.—On the constitution of natural silicates, by Dr. K. Haushofer, is a lengthy paper dealing with the probable constitutional and graphic formulæ of these bodies.—On the polyolenes and on the change of ethylene into ethyl alcohol, by W. Goriainow and A. Butlerow.—On protein substances, by H. Hlasiwetz and J. Habermann.—On the compounds of the camphor group, by J. Kachler. The author describes pimelic acid, $C_7H_{12}O_4$, and many of its salts.—On the isomers of amylen obtained from the amylic alcohol of fermentation, by F. Flavitzky.—On the synthesis of anthracene and dimethyl-anthracene, by W. A. van Dorp.—On cerulignone and its derivatives, by C. Lieberman. The author regards cerulignone as a quinone.—On pentabrom resorcin and pentabromocin, by C. Lieberman and A. Dittler.—The number concludes with an abstract from M. L. d'Henry's late paper in the *Comptes Rendus*, on the use of the sodium flame for observing litmus tints in alkalimetry.

Verhandlungen der k. k. geologischen Reichsanstalt. Nos. 1 to 6. (1873.) Amongst many other papers of interest contained in these numbers of the Proceedings we note the following:—On the occurrence of a new genus and new species of palm seed-vessel (*Lepidocaryopsis Westphaleni*) in the cretaceous sandstone of Kaunitz in Bohemia, by D. Stur.—Notices of the earthquake at Vienna on the 3rd January, by Dr. G. Stache.—Hugo Rittler's sketches of the rothliegende in the environs of Rossitz, by D. Stur.—On the analogies of the three carboniferous resins, anthracox, middletonite, and tasmanite, and their probable origin, by O. Feistmantel.—On the geological position and distribution of the silicified woods in Bohemia, by the same author.—The usual literary notices and other matters accompany each part of the Proceedings.

Ocean Highways, December. This number commences with an appreciative memoir of the late Sir Robert Maclure. An article entitled "The Straits of Magellan" contains some very interesting information concerning the little known region in that quarter of the world, and what has been done recently for the settlement of the mainland-coast of the straits. The paper recommends to emigrants Sandy Point, the Chilian settlement at which most of the steamers touch on their way to and from the West Coast, and which "is admirably situated on Brunswick Peninsula, nearly on the line of demarcation between the dense forests which cover the whole western end of the Straits, and the naked, rolling Pampas, which spread uninterruptedly northward to the very shores of the river Plate."—H. H. Giglio sends a letter, with some remarks from Dr. Beccari, on the latter's Exploration of Papuaia. Three small maps of parts of New Guinea illustrate the discoveries of Beccari, D'Albertis, Moresby, Cerruti, and Meyer.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, Dec. 11.—"On the Action of Heat on Gravitating Masses," by William Crookes, F.R.S.

The experiments recorded in this paper have arisen from observations made when using the vacuum-balance, described by the author in his paper "On the Atomic Weight of Thallium,"* for weighing substances which were of a higher temperature than the surrounding air and the weights. There appeared to be a diminution of the force of gravitation, and experiments were instituted to render the action more sensible, and to eliminate sources of error.

After discussing the explanations which may be given of these actions, and showing that they cannot be due to air-currents, the author refers to evidences of this repulsive action of heat, and attractive action of cold, in nature. In that portion of the sun's radiation which is called heat, we have the radial repulsive force possessing successive propagation required to explain the phenomena of comets and the shape and changes of the nebulae. To compare small things with great (to argue from pieces of straw up to heavenly bodies), it is not improbable that the attraction now shown to exist between a cold and a warm body will equally prevail when, for the temperature of melting ice is substituted the cold of space, for a pith ball a celestial sphere, and for an artificial vacuum a stellar void. In the radiant molecular energy of cosmical masses may at last be found that "agent acting constantly according to certain laws," which Newton held to be the cause of gravity.

Dec. 18.—"On Double Refraction in a Viscous Fluid in motion," by Prof. J. Clerk Maxwell, F.R.S.

According to Poisson's† theory of the internal friction of fluids, a viscous fluid behaves as an elastic solid would do if it were periodically liquefied for an instant and solidified again, so that at each fresh start it becomes for the moment like an elastic solid free from strain. The state of strain of certain transparent bodies may be investigated by means of their action on polarised light. This action was observed by Brewster, and was shown by Fresnel to be an instance of double refraction.

In 1866 I made some attempts to ascertain whether the state of strain in a viscous fluid in motion could be detected by its action on polarised light. I had a cylindrical box with a glass bottom. Within this box a solid cylinder could be made to rotate. The fluid to be examined was placed in the annular space

* Phil. Trans. 1872.

† Journal de l'Ecole Polytechnique, tome xiii. cah. xx (1829).